Electronic Supplementary Information:

Collagen Skin, a Water-Sensitive Shape Memory Material

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Effect of thickness on mechanical properties of CS

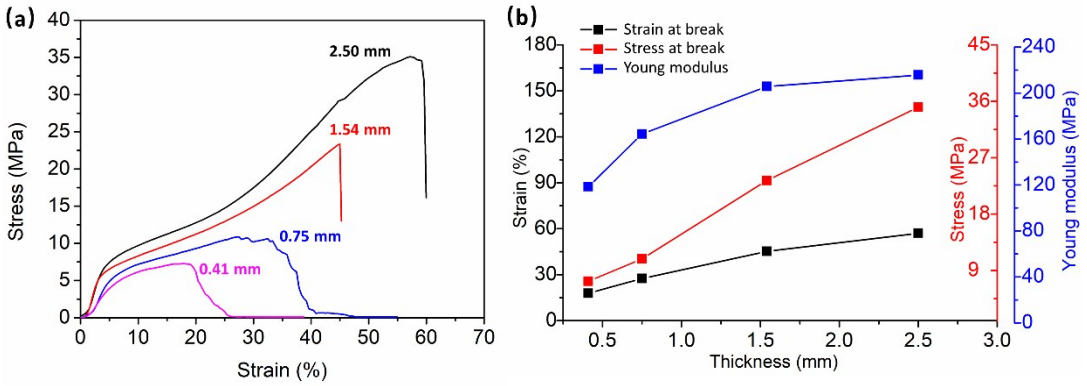

Figure S1. a) strain-stress curves of CS with different thickness; b) strain and stress at break, as well as Young modulus of CS as a function of thickness.

Original collagen skin has a thickness of 2.5 mm. Since thickness was reported to influence mechanical properties of nonwovens[1], it is supposed that CS with natural fibrous structure may also exhibit same performance trend. To verify this, CS with different thickness (1,54 mm, 0.75 mm, 0.41 mm) was prepared by a splitting machine (LEPUSHOUGONG, China). The obtained samples were dried in fume hood at room temperature for 12 h to a constant weight. The moisture regain of samples were measured to be in the range of 10% to 15%. Mechanical properties were measured by

using Instron 5566 at an elongation rate of 10 mm/min. Results are shown in Figure S1. It can be seen that with reducing the thickness of CS, the mechanical properties of gradually decreased (Figure S1a). Particularly, when the thickness is less than 1 mm, strength and strain at break of CS decreased by over 60%. Such impairment may because that splitting processing damages the entangled collagen fiber network which are formed by natural growth, as a result, the loosen packing network of CS with thinner thickness can withstand excessive external force.

Reference:

1. A. Watanabe, M. Miwa and T. Yokoi, *Textile research journal*, 1999, **69**, 1-10.